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Attached is forwarded as received. This report discusses guided missile research at Ostashkov (N 57-08, E 33-07).

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Comment: The full names of two German experts mentioned in the report are Helmut Groettrup and Karl-August Muennich. The Soviet colonel mentioned in paragraph 30 is probably Col. Yuriy A. Pobedonostsev. The other two Russian names in that paragraph should probably be spelled Pilyugin and Ryazanskiy.

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COUNTRY USSR REPORT

TOPIC Rocket Developments at the NII 88 Branch Institute No 1 in Ostashkov

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REMARKS

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Postwar Activities of German Specialists in Germany

1. During the summer of 1945, a group of all former members of the Peenemuende experimental station living in East Germany, was organized by the Soviets. Most of the individual departments from Peenemuende had been transferred to Bleicherode which therefore, became the new research station, designated "Rabe Institute". The German engineers collected and recomposed all development and production records of the A-4 project. The records on airframe, power unit, airborne instruments and testing equipment were stored away in the Bleicherode area and could be recompiled. A great number of semi-finished A-4 units produced by the so-called "Mittelwerk" were also found in this area and could be 9[illegible] percent completed by the "Rabe Institute". The ground equipment was also essentially reconstructed except for the "Wolmann-Gerae", a combustion cut-off unit. Fifteen A-4 missiles were completed and the essential assembly parts for 15 additional A-4s could be reconstructed.

2. The scientific work accomplished at the Rabe Institute included:

a functioning report on the modus operandi of the A-4
and scientific reports on the following subjects:

Stability theory
ballistics and aerodynamics
acceptance specifications
manufacturing directions
the operation of a unit by the troops
testing and acceptance instruments for the production

3. The ground equipment included two FMS trains. FMS or "Fahrbare Meteorologische Station" (mobile meteorological station) was the previous German designation for these approximately 100-axle trains which carried all the equipment

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4. The former German test stand for combustion units at Lehesten near Saalfeld/Thuringia was remodeled for experiments with the complete power

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units, and models of the power unit casing were made in order to develop proper installation procedures.

5. The German engineers anticipated an improvement of the A-4, which was planned by an incorporation of all those improvements which had been worked out in Peenemuende but which could not be finished. The R-10 missile designed in the USSR was based on the work done by the German experts in Bleicherode. The major improvements were an increase of the accuracy of fire and an essential simplification of the unit. A planned conference with Soviet specialists was repeatedly postponed, because some high ranking persons from Moscow had not arrived. The meeting was finally held on 21 October 1946 in Bleicherode. In the early morning of 22 October, the Germans were deported to the USSR.

Activities at NII 88 Branch Institute No 1.

6. A-4. The construction records for the A-4 prepared in Bleicherode were the basis for the production of the missile in the USSR. The production was handled by Soviets only. The activities started with the assembly of the essential parts brought from Germany. No information was obtained on the number of A-4s assembled. The newly assembled units were declared to be Soviet products and compared to the ones assembled in Bleicherode. Between September and December 1947, launching tests were conducted with Soviet and German made missiles at the Kapustin launching site. Twelve missiles were fired at a range of about 225 km. The percentage of failures did not exceed previous experiences at Peenemuende. The Soviets triumphed when a so-called Soviet A-4 was successfully fired, while a German projectile failed. The experimental firing was conducted with and without guide beam, and with and without an integration unit and a "Wolmann-Basis" (combustion cut-off unit). The Wolmann units were assembled by another group of deported German scientists working under Muennich (fnu).[1] The FMS trains were assigned one to military personnel and the other one to civilians. The German experts under Groettrup watched the experiments conducted by both teams.

7. R-10. The Bleicherode records for the R-10, an improved version of the A-4, were no longer available in the USSR. The German specialists appreciated their chance to develop a missile which in all its parts was to follow their own ideas and not the Peenemuende developments. The project, completed in 15 stages, was first presented to a scientific technical council which arrived from Moscow at NII 88 in the spring of 1947. This commission, however, rejected the project because the basic records were not satisfactory. In 1948, however, when presented for the second time the project was approved and its completion was urged by the Soviets.

8. Except for the external shape which followed the A-4 dimensions, the R-10 differed from the A-4 in all its essential parts. The R-10 had a range of about 910 km and a pay load of 1 ton. The new fuel tanks were a remarkable design. Their walls which were simultaneously the outer skin of the missile were so thin that stability could be effected by the interior pressure only. The new combustion unit which was externally unchanged was adopted for modern production methods of monocoque construction. Its length was reduced about 50 cm which left more space for the fuel containers. The containers were separated by one bulkhead. The entire steam generating equipment was eliminated because the gas required to drive the turbines was tapped from the combustion unit and cooled. Compressed air fed by a ground unit was used to drive the turbine before the combustion unit had accumulated the required pressure. As soon as the turbine attained sufficent RPMs it could be driven with gas from the combustion unit. By increasing the pressure of the combustion unit to 20 atmospheres it was possible to achieve an increased thrust of 22 tons. Since the tail of the

projectile offered enough space for the instruments, an auxiliary compartment was no longer required. The missile was greatly simplified and the number of 42 instruments of the A-4 was reduced to 11. The war head of the R-10 was not rigidly connected to the projectile and separated from the unit as soon as the combustion cut-off signal was given. The separation was effected by two powder-fueled rockets arranged in the opposite flight direction which would slow down the projectile while the warhead approached the target by itself. The further performance of the projectile was therefore no longer a problem and premature explosions were prevented. The missile was fueled from the tail and except for one, all flaps were eliminated. The A-4 type ignition was installed also in the R-15.

9. Only 20 minutes were required to prepare this projectile for the take-off. Before the launching process, pressure was produced in the containers by a ground unit, and during the flight it was balanced by airborne oxygen. Compressed oxygen was also used to drive the piston--type rudder engines. Since it was found that steering by means of exhaust jet controls was sufficient, the external control vanes were eliminated. Contrary to the A-4, the combustion cut off was accomplished in one stage. Water shocks which might have occurred during this process were eliminated by rerouting the liquids, and the quantity of fuel remaining in the tanks was reduced to a minimum by very short floor tubes in the tanks.

10. An entirely new guiding system was designed for the R-10. Instead of the curved flight path the so-called "straight propulsion path" was used. After the projectile, launched vertically, had reached a sufficient speed, it was programmed into a straight line of flight and remained there until the combustion cut off signal was given. This system had the advantage of essentially simplified ground equipment for the guide beam. The required control equipment was set up in the extension of the straight flight path, and cast the beam only in this one straight direction. The airborne instruments were also much simpler. Instead of the heavy battery of the A-4, only a small motorcycle battery was required. Vertical and horizontal control was effected according to the AN method for instrument landing flying on a beam operating in the 50 cm wave band.[2] Theoretical calculations made to increase the firing accuracy resulted in the conclusion that a maximum accuracy can only be achieved by radio. A difference was made between the so-called "autonomous (airborne) control" and the "radio control" from the ground. It was anticipated that Soviet-produced gyroscopes would be used. A precise combustion cut-off was also required for accurate firing it. This was accomplished by obtaining precise path and time factors. The path figures were measured by a radar impulse system, while the speed was obtained according to the Dobler principle. Toward the end of the propulsion path, the thrust was kept constant when the speed limit was reached at which time the light structure containers were still capable of transmitting the driving power to the warhead. The loss of driver power caused by the limited thrust was compensated by a possible weight reduction of the fuel containers. Since no facilities for wind tunnel tests were available at that time, the aerodynamical data of the A-4 had to be applied. The figures were taken from a Swiss technical magazine. This new type of construction effected a reduction of the mass ratio to 0.13 to 0.2.

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11. The project was completed in 1949. The only experimental records available for the R-10 were obtained in statistical experiments to determine the strength of the welding seams and experiments for the gas discharge from the combustion unit. A test model of a combustion unit unit had been constructed to produce just enough required to drive the turbines. A second experiment with an original combustion unit was planned. Five complete control units were constructed and tested on a "Bahnmodell" path model. A complete set of the radio controls was tested with aircraft. The combustion cut-off velocity was 2,500 m/sec.

12. R-14. In the summer of 1949, a new work order was received from Ustinov (fnu) Minister of Armament and Ammunition who visited NII 88. The following data were requested:

> "Range 3,000 km, payload 3 tons, firing accuracy not more than 1 mile. The project has to be started immediately; development period five months."

13. In order to fulfill these extreme requirements, three different versions were carefully considered including:

a. a multi-stage rocket

b. a multi-stage rocket of an unconventional type

c. a winged rocket

Of the variations worked out for each of the three projects considered, the R-14, a single-stage rocket, and the R-15, a winged rocket, were finally developed. Groetzrup was chief in charge of the R-14 project. Information on the R-15 was only obtained in conversations with other engineers.

14. The R-14, started with calculations for the so-called "sketch project", finally reached the status of a "technical project". The experience with the R-10 was valuable. The new rocket, conical in shape, deviated completely from previous designs. The walls of the fuel containers were, as on the R-14 the outer skin. In order to obtain a sufficient fight stability of the conical rocket, the tail had to be extended. No aerodynamic disadvantages were connected with this tail unit, the so-called apron made of corrugated sheet-metal, because the uneven skin was levelled by the boundary layer. The unit was statically designed to continuously keep a position close to the neutral equilibrium. The discharging fuel containers caused the center of gravity of the projectile to travel slightly back and forth and the center of pressure was effected when the missile changed from subsonic into supersonic regions. Deviations from the neutral equilibrium were not to exceed a degree which could not be neutralized at any moment by the controls. Except for the bottom of the fuel container which had to take the whole thrust, and was, therefore, made of strong steel calotte, the entire body was made of steel sheet, 1 mm thick resisting a stress of 100 kg/mm.^{2} Directional control was effected by a tilting combustion unit. For this purpose, the combustion unit and the bottom of the fuel container were connected by two crossed knife-edge suspensions. The servo unit tilting the combustion unit was equipped with hydraulic operated pistons.

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15. The R-14 turbines were also activated by gas discharged from the combustion unit. Because of the high rate of flow, the turbines operated in two steps. This system had the advantage that the "B-Stogg" for the cooling of the combustion unit was availble in two pressure stages. The thin walls of the internal pressure on the entire length of the walls of the combustion unit was subjected to fluctuations and three different pressure stages were applied. The exhaust unit was fed with "B-Stoff" tapped from the first turbine stage at a pressure of 5 atmospheres. The neck of the combustion unit was provided with slots to further reduce the pressure. Fuel from the second pressure stage was used to cool the combustion cell itself. The three different systems developed for the gas discharge included:

a. Gas discharge through an immersion pipe as planned for the R-10.
b. Gas discharge through belt shaped slots.
c. Gas discharged through two opposite apertures.

Fuel was injected by swirl nozzles at a combustion chamber pressure of 60 atmospheres. The fuel had no longer to be atomized but good mixing was of importance. The Soviets suggested a ceramic lining of the combustion unit which, however, was never used. An "active control" (auto-control), installed in addition to the tilting combustion unit was to prevent rolling by putting two small exhaust nozzles for the turbine gases into use.

16. The war head, being cylindric in shape because of aerodynamical advantages did not follow the conical shape of the entire projectile. A cylinder continues to travel in axial direction after reaching the atmosphere provided that the center of gravity is located far enough forward. The war head had to be insulated because of the projectile's travelling through the atmosphere at a speed of 4 to 4.5 km/sec. The problem was solved by covering the cylindric war head with wood which charred during flight and produced enough insulation. The war head extended in a cone made of extremely thin materials and was provided with a bore hole in the tip in order to balance the external air pressure with a ramming pressure produced inside the cone. The R-14 war head also separated from the airframe. The combustion unit had the dimensions of the A-4 combustion unit. Due to the increased rate of flow, however, and a pressure of 60 atmosphere, it produced a thrust of 100 tons. In order to fill the requirements of firing accuracy, the combustion cut off had to be activated within less than 1/100 sec. For this purpose the valves were rapidly closed with gun powder.

17. No special ground station was planned for this complicated unit which was to be launched directly from its underground assembly shop. The ballistic requirements made it necessary that the last portion of the flight path to be precalculated down to the millisecond. The combustion cut off signal was given at an altitude of up to 110 km to eliminate ionospherical disturbances on the radio transmitted signal. During the last part of the straight propulsion line, the thrust was reduced by throttling the valves. The thin walls of the projectile made an acceleration limitation of 10 g necessary. The loss of power could partly be balanced by a rather low net weight of the rocket.

18. Basic date for the R-14 project included:

output velocity	:	150 m/sec
combustion cut off velocity	:	3,500 m/sec
combustion period	:	140 sec

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mass ratio	:	about 1 to 10
take-off weight	:	70,000 kg
net weight	:	6,900 kg
to include: pay load	:	3,000 kg
airframe	:	1,400 kg
power unit	:	2,000 kg
controls	:	about 200 kg
gas and remaining quantity of fuel	:	about 300 kg

19. R-15. Only little information was obtained of the R-15 project. Similar to the German V-1, the winged glider rocket travelled at a constant altitude. The development carried out by Professor Albring (fnu) who at the present time is at the Dresden Institute of Technology, never exceeded the preliminary project. The power plant included one take off and one cruising unit. A Soviet improved version of the A-4 power unit with a thrust of 35 tons was to be installed as take off unit, while a Lorin-type ram jet equipped with JUMO combustion chamber was to produce cruising speed. The R-15 wings were dihedral. The service ceiling was allegedly 40 km and the cruising speed 3 Mach. The projectile was to be steered by means of external control vanes with radio transmitted signals. The rocket was to be launched vertically. The advantages of the R-14 were considered to have been its light and inexpensive construction. The problem of defensive measures against this rocket, especially by ground--to-air and air-to-air firing, was not solved. Test stand experiments were conducted primarily to determine the possibility of gas discharge. On Soviet demand, petroleum was used instead of alcohol for the combustion tests.

20. AA rockets. Information on AA rocket developments was obtained in conversations with other experts. During a Berlin-Moscow telephone conversation, in May 1946, Groettrup refused to accept an order to reconstruct German AA rockets because he did not feel capable enough. On their arrival at NII 88, a group for AA rockets was branched off from Groettrup's group of scientists. This group working at NII 88 was enlarged with new German experts arriving from Germany. Development activities in the field of AA rockets were handled only by Soviets with the German experts being consulted for individual problems.

21. Wasserfall. Research on the Wasserfall type rocket conducted in 1948, included ballistics, aerodynamics and stability. A completed set was never observed, but spherical nitrogen containers were seen at Plant No 88. Launching tests presumably took place in late 1948. It was also believed that the Soviets started to produce Wasserfall missiles after the German engineers had been repatriated. A test stand for the power units was available.

22. Schmetterling. It was learned that Plant No 99 worked on the controls of the Schmetterling rocket.

23. Taifun. Combustion units for the Taifun were allegedly produced at Plant No 88. For this purpose experiments were conducted to determine how much the material can be pressed into shape during the lathing process. No information was available on the proximity fuse and target seeking devices.

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24. R-113. This project started in the USSR was primarily based on studies by Dr. Hock (fnu). In order to save the launching carriages, the plani wing rocket was to take off vertically, probably without special take off power unit. The missile was to be directed to the target by a three point system, with the three points, target, traveling projectile and ground observation station, being arranged in a straight line. A new system, developed for the guidance from the vertical take off into line of sight, was referred to as "Kugelhund" and involved a pursuit curve on the "Einheitkugel" (sphere of the unit radius). The direction to the flying rocket and to the target was set by two points on the sphere of unit radius. The point indicating the position of the rocket was moved on a pursuit curve (dog curve) to the target also from the sphere. From there on the rocket was to be controlled by the three point system. The R-113 rocket to be used against targets located in a crater with an aperture angle of 120 degrees was rated for a range from 5 to 25 km. The Soviets allegedly critized the rocket primarily because plani wing rockets usually had difficulties following a target.

Rocket Types

25. Rocket types observed in the USSR:

V-2 - A-4

G-1 - R-10, designated so after 1948
R-11, German designation for a Soviet parallel development to the R-10. The unit was also referred to as Korolov Rocket.
R-12, an intermediate project of which many variations were prepared and which eventually resulted in the development of the R-14.
R-13, Umanski (fnu), Soviet expert for power units at Plant No 88 ordered the German group to develop under time pressure, airframe and control units for a rocket with a pay load of about 1 ton and a range of about 200 km with a forced feed system instead of a trubine. This intermediate project was later dropped.
R-14
R-15
- - designation unknown, Soviet parallel development to the R-15.

26. Path models for stability tests of rockets were constructed at Peenemuende during the war. Another model started at Bleicherode after the war was not completed by the time the German experts were deported. In Moscow, the path model was considered to be one of the first projects undertaken with great interest by the Soviets. In about 1949, NII 88 Branch Institute No 1 completed the first test model. A number of improved instruments including models for special purposes followed.

Activities at NII 88 Branch Institute No 1 after the Repatriation of the Germans.

27. Project R-113, completed in the spring of 1951, was the last project of the German group at Branch Institute No 1. If work in the field of rocket techniques was continued at the institute this was done without German assistance and only with stationary equipment.

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a. On Test Stand No 1 the Soviets continued experiments initiated by the Germans for gas discharge units to supplement and confirm the previous data. These experiments were probably successful. No details were obtained.

b. Activities at the Institute of Aerodynamics were conducted primarily to train Soviet personnel. In the summer of 1954, the wind tunnel was dismantled and allegedly shipped to Moscow. It was believed that construction of this test stand had been ordered from the Germans at Branch Institute No 1 only to be set up for Soviet purposes at another location.
Compressed air for the tunnel was fed from about 70 (?) containers, each with a capacity of 1 cubic meter and a pressure of about 200 atmospheres. The measuring section was about 15 cm in diameter, according to the Mach No applied. The Mach No could be adjusted by activating various numbers of nozzles up to about Mach No 5.
The wind was blown vertically upwards.
The quick acting valves, constructed at Branch Institute No 1 were automatically controlled.

c. Soviet engineers continued to work on the flight test of the R-10 radio equipment. It was frequently mentioned that the radio unit' should be shipped away probably to a testing field. But this plan was not realized before Groettrup was repatriated in November 1953.
It was believed that, if no camouflage maneuver of the Soviets was involved, NII 88 Branch Institute No 1 was no longer of any significance as rocket development station after the repatriation of the German experts. Priority was given probably to Plant No 88 in Moscow/Podlipki and also to the Kapustin launching base, which was designated Branch Institute No 2.

The Status of Soviet Rocket Developments at the Arrival of the German Experts.

28. Only little information wasobtained on previous Soviet rocket developments. The extensive Soviet literature covering this field contained little literature on space navigation in all countries, quite a few utopic studies and some serious scientific reports. Some of the literature, including technical magazines, was classified. Basic records on guided missiles or the units were never seen. In conversation with Soviet experts, it was learned that the Soviets had intensively worked on rocket problems and that they were quite proud of their long tradition in this field. The Soviet chief of Plant No 456 worked without results on gas discharge from the combustion unit.

The Value of the German Activities for the Soviets.

29. The Soviets at least obtained valuable ideas and new directions for their rocket developments from the work of the German experts in the USSR. It can be assumed that the leading Soviet rocket experts, Korolov for example, are capable of utilizing the results obtained by the Germans for their own projects. The R-15 is probably some sort of control project for comparison against a Soviet parallel development which had been started earlier. The requirement of a long range rocket, range 3,000 km and pay load 3 tons, without any basic records on the specific weight available to the Germans, tends to indicate that the Soviets planned to install atomic war heads. It was assumed that a production plant, at least for small series of A-4 rockets and of the improved versions, was located in the Ural Mountains. This assumption was based on rumors spread by the Soviets that General Gonor (fnu) when absent for six months was establishing such a plant at some unknown place in the Ural Mountains.

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30. Groettrup believed that a small experimental series of A-4s was being produced by the Soviets when the German engineers were repatriated. It was assumed that this rocket was being produced only for experimental purposes for rocket production and that, after they had enough experience, the Soviets would probably produce the Korolov rocket. This assumption was based on the theory that the Soviets were still learning to produce airworthy rockets in order to be able to produce at least an improved version of the A-4, presumably the Korolov rocket rather than the R-10. In addition to the Ministry of Armament, departments of the Ministry of Telecommunication Techniques dealt with rocket developments. The latter ministry, for instance, had requested the simplification of the switching system of the airborne radio unit of the A-4. This project was carried out by Pilugin (fnu), at the time Soviet chief designer at NII 88, whose work in this field was supervised by the Ministry for Telecommunication Techniques. Pilugin was replaced by Reasanski (fnu) who in turn replaced Colonel Pobyebonostov in his position as chief engineer at NII 885. Groettrup considered both Soviets to be well-qualified and Reasanski capable of carrying through his ideas. First information on the simplified switching system was received in 1947, when the German expert Moennich made a statement about it at Kapustin launching base. At that time, these activities were not yet completed and no details could be obtained. The Soviets probably initiated the launching experiments at Kapustin to test the reconstruced A-4 and to demonstrate the capability of the Soviet personnel for preparing a missile for the take off and launching it. Groettrup maintained that the R-10 was technically useful and that no basic failures were to be expected with this rocket.

31. Statements made by Korolov at a Moscow technical conference held New Year 1949/1950 indicated that the Korolov rocket was a Soviet parallel development to the R-10, and had adopted the following parts from it:

a. The separating war head
b. The gas discharge system
c. and, with certain restrictions regarding the radio transmitting, the control system.

In 1948/1949 the German group was ordered to produce 5 complete R-10 control sets for the Soviets and were asked whether radio control could be replaced by A-4 directional controls or not. The Germans stated that this would be possible but useless for mass launching. Groettrup believed that the Soviets disliking radio controls, tended to install autonomous servo units like that of the A-4 or other types instead. During the same period, the German experts were ordered to prepare a construction model of shorter A-4 power unit. The sketches were forwarded to Moscow. Because some non-available instruments had to be replaced by dummies, the model was not ready for operation. The model was stored at Branch Institute No 1 for some time but the Soviets paid no longer any attention to the set. In 1949, Korolov asked Groettrup to check two samples of welding seams on fuel containers and to identify the Soviet and the German-made sample. The welding done on either sample was equal in quality and precision. The Soviets had learned a great deal of welding techniques from the Germans.

32. It was believed that the Korolov rocket carried a pay load of 1 ton and was designed for a range of about 600 km.

a. As was learned from Korolov at the Moscow meeting, the rocket had a separating war head similar to the R-10.

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b. Theories for an improved A-4 worked out in Germany before the deportation of the German scientists were utilized for the auxiliaries. The Korolov rocket was equipped either with an auxiliary compartment shorter than the one of the R-10 or with no compartment at all.

c. The fuel tanks were installed in the middle portion of the missile. Like the A-4 containers, they had extra walls but were about 150 cm longer. Korolov mentioned to Groettrup that the solution of the container problem for the R-10 was quite elegant but that he, personally, did not believe in these "made containers."

d. Since the tail unit of the Korolov rocket was never mentioned, it was assumed that it resembled in shape the A-4.

e. The control system was probably very similar to the R-10, as was concluded from the Soviet order for 5 R-10 control units and the question asked in this connection.

f. The great Soviet interest in the gas discharge system before 1952 tended to indicate that the rocket was equipped with an R-10 type power unit. Korolov, who believed that the R-10 airframe was stability risk, probably designed a different fuselage for his rocket.

Production.

33. No direct information was known about production. According to the status of technical developments in the USSR in 1950, it can be assumed that, starting in 1951, the Soviets were capable of series producing an improved A-4 version, probably the Korolov rocket or a combined R-10-Korolov type unit, provided that the developments were not handicapped by any delays. The R-14 was also considered a very useful project. Since the Soviets never mentioned this project again after it had been completed by the Germans, and never asked any pertinent questions, it was assumed that the R-14 was either dropped or that is production was successfully camouflaged.

34. The Soviets probably had already worked on a glider rocket before they ordered the German group to design the R-15. Compared to the R-14, an entirely new project was involved. In 1947 or 1948, a Russian translation of Dr. Eugen Saenger's book on rockets was shown to Stalin and the Germans were asked to comment on this book. This tends to indicate that the Soviets were very much in favor of a glider rocket project at that time. The German comment on Saenger's book, however, was that "the project, as seen by Saenger, can hardly be realized", inasmuch as:

a. A mass ratio of 0.1 could not be achieved.

b. The output velocity of 3,000 to 5,000 m/sec, taken by Saenger, did not exist.

c. A glide ratio of 0.2 cannot be achieved.

d. The problem of the atmospheric heat effect on the missile was not mentioned at all. The presumed velocity of 800 m/sec required a throttling of the missile before it reached the atmosphere. The Soviets did not accept the German criticism, probably because of political reasons. Their interest in a Saenger type glider rocket was also indicated by two orders which the German engineers who remained behind in the USSR received in 1952:

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e. The development of an instrument which, by measuring the pressure can keep an aircraft at a constant altitude of 14 km.

f. The construction of a gyroscopic arrangement similar to the 24-minute pendulum, to be used as servo unit for a rocket similar to the R-15.

Both work orders, most likely requested for a glider, were probably never completed. The request for an altitude control instrument tends to indicate that Saenger's phugoid flight path was to be replaced by the R-15 flight path with its optimum altitude of 14 km. The Soviet glider rocket project was based on the "Saenger-Brett-Prinzip" (Saenger type board system), a pay load of 3 tons and a range of 3,000 km which due to the power system could still be increased. The development stages of the rocket were assumed to be:

1954 ground testing
1957 ready for construction
1958 series production 3

1. [redacted] Comment. This refers to the expert group working on A-4 controls which, prior to February 1948, had been assigned to Scientific Research Institute No 885 in Moscow. [redacted] 25X1 25X1

2. [redacted] Comment. This refers to the so-called Hawai system. [redacted]

3. [redacted] Comment. For a list of Soviet experts, see Annex. 25X1

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Personal Description of Soviet Experts.